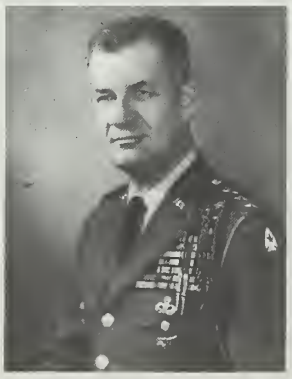
Commander's Call

HUMAN RELATIONS IS EVERYBODY'S BUSINESS

I have recently dispatched to the CDC Commanders a letter that reiterates my policy and provides command guidance concerning Human Relations.

It is appropriate that this information be understood by every member of CDC. Accordingly, I have taken this opportunity to make the widest distribution of the letter which follows:

> "Human Relations is a command responsibility! Commanders and supervisory personnel must be attuned to the multitude of problems that can arise in Human Relations. This term encompasses all matters pertaining to race relations, equal opportunity and treatment of personnel, and alcohol and drug abuse.
>
> Our Country must depend on a strong, unified Army---one that is not divided by racial discord or unequal treatment of personnel, or whose effectiveness is not reduced by alcohol and drug abuse. Keeping the Army strong and unified is the responsibility of everyone of us. Positive support and action are required and each of us must give his personal attention to eliminating racial discord or unequal treatment of personnel.
>
> To make this policy work, every possible channel of communication between commanders and subordinates must be kept open. Every formal or informal report of racial discord or unequal treatment of personnel, and each instance of alcohol or drug abuse, should be closely examined and promptly corrected as dictated by the best available evidence and sense of fair play.
>
> Our success in keeping the Army strong and unified depends on solving our Human Relations problems without hesitation or equivocation."



John Norton

JOHN NORTON
Lieutenant General,
U.S. Army
Commanding

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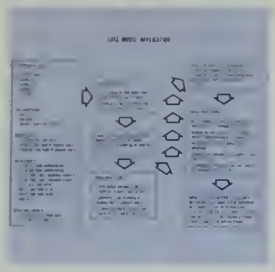

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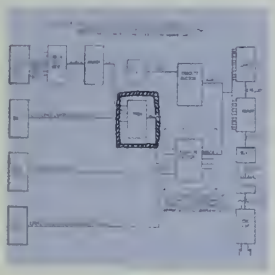

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ARROWHEAD

COMBAT DEVELOPMENTS COMMAND

September 1972 No. 43

ARTICLES

REGULAR FEATURES

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LOTS BY . . . COMPUTER

BY LT. ALFRED W. ALLEN

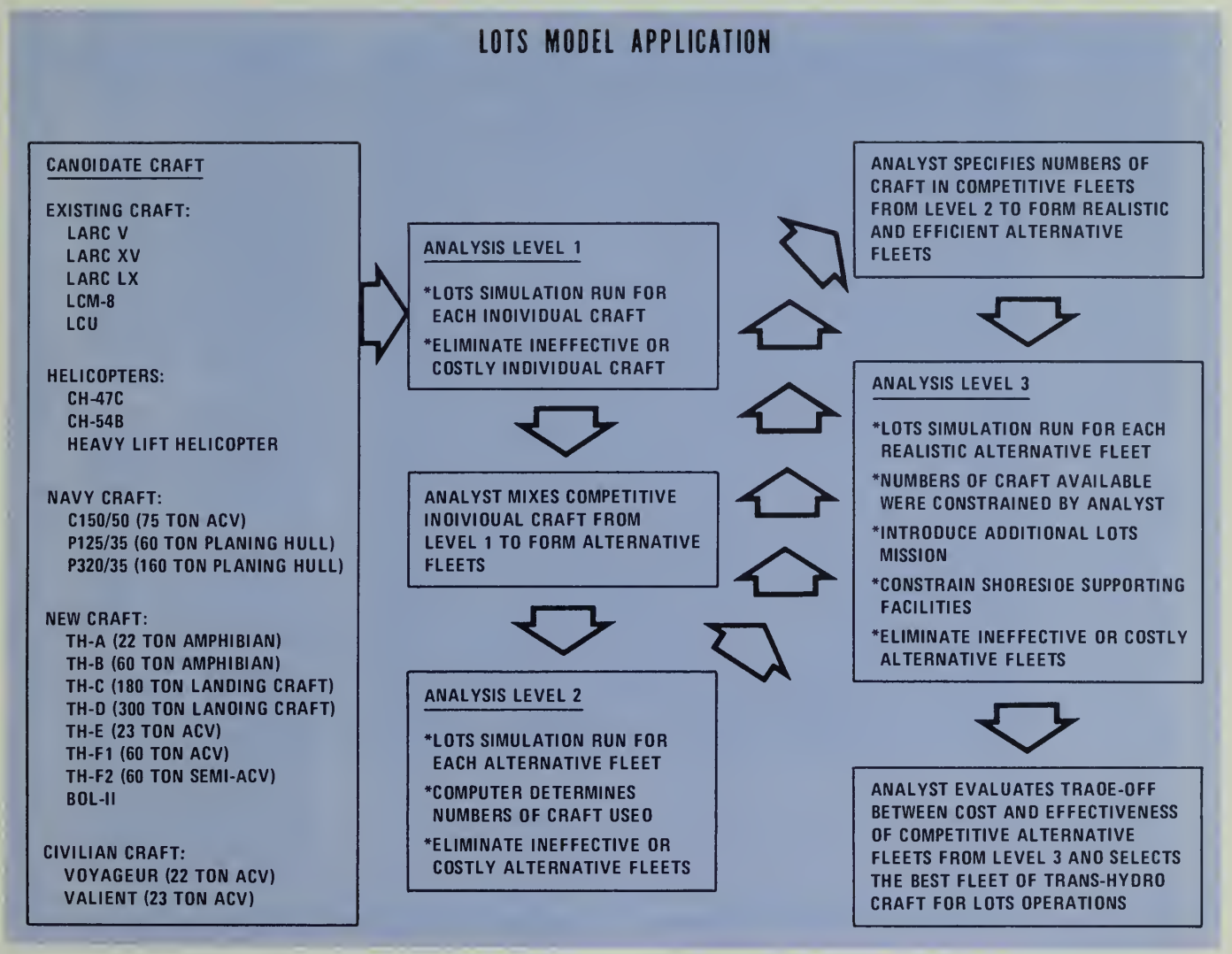
The modern Army must be able to rapidly deploy and supply its forces in all parts of the world, often without the benefit of developed logistical facilities in the theater of operations. To meet this need, logistic-over-the-shore (LOTS) operations must be performed to move men, equipment, and cargo across relatively unprepared beaches to inland staging areas and supply points; yet the current Army inventory of crafts for LOTS operations remains essentially the same as it was 15 years ago.

This situation gave birth to the U.S. Army Trans-Hydro Craft Study. Its primary objectives are to evaluate and select the fleet of craft and support facilities that the Army will need for LOTS operations in the 1975–1985 time frame. The "trans-hydro craft" that must be examined include landing craft, amphibians, air cushion vehicles, and helicopters—those craft in the existing inventory as well as potential future craft. In general, any kind of craft that can assist in the LOTS mission is under consideration. No doubt, the best LOTS system is composed of a variety of different kinds of craft, each suited for a particular portion of the mission requirement.

Lt. Allen is currently assigned to the CDC Systems Analysis Group, Scientific Services Directorate, Ft. Belvoir, Va.

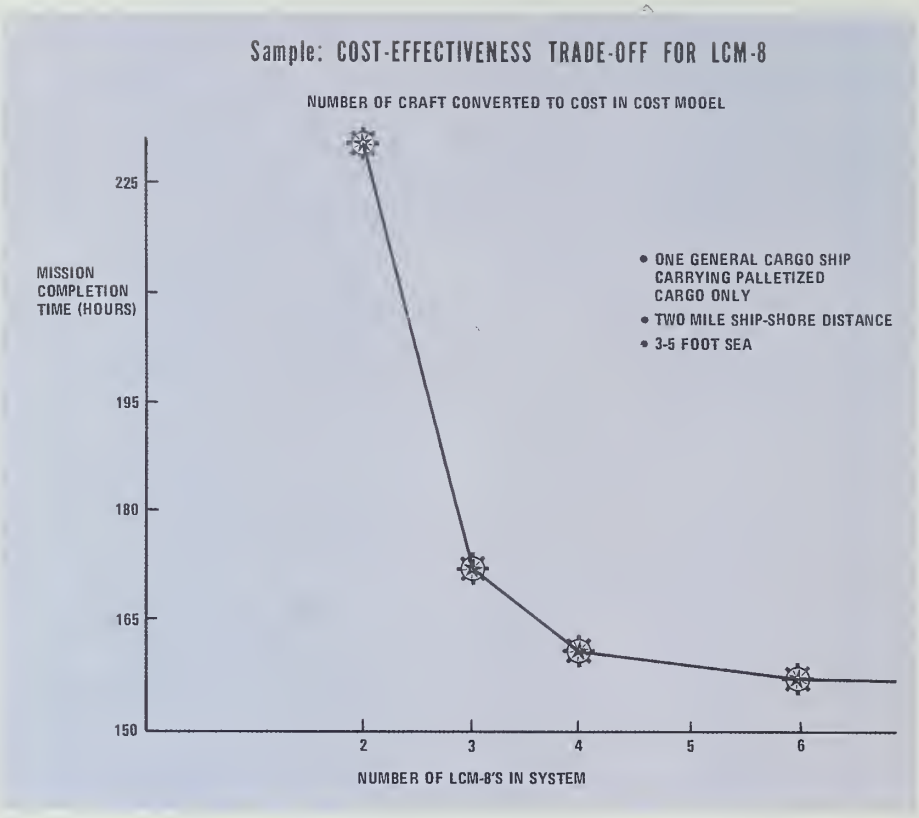
Responsibility for the conduct of the Trans-Hydro Craft Study was assigned to the Combat Developments Command Transportation Agency, a working-level agency under the general supervision of the USACDC Personnel and Logistics Systems Group. After drafting a study plan, the Transportation Agency contacted the USACDC Systems Analysis Group (SAG) to discuss the possible application of operations research techniques to the study. The mission of the Systems Analysis Group is to provide operations research, systems analysis, and related scientific support to the agencies of the Combat Developments Command. This support ranges from suggestions for an analytical approach in a study to large-scale modeling efforts performed by the professional operations research experts at SAG.

A number of problems are commonly encountered when a complex logistics system, or for that matter any large-scale military or civilian system, must be analyzed and evaluated. Although logistics experts know how the individual components, or items of equipment perform, it is often difficult to predict how a total system will perform; i.e., how many different items of equipment (for example, a fleet of trans-hydro craft,



material handling equipment, and cargo ships) will perform and interact in numerous combinations. More precisely, it is difficult to quantitatively assess the relative worth of alternative competing systems so that a decision-maker will have a basis for determining the best alternative. While complex logistics systems can be observed and evaluated using field testing to duplicate as much as possible a mission-oriented wartime situation, this is usually prohibitively costly and time-consuming. Furthermore, in studies such as Trans-Hydro it is necessary to evaluate the performance of conceptual systems and items of equipment for which a realistic prototype is not available.

The mathematical discipline of operations research (OR) was created to help solve problems such as these without the necessity of carrying out the operation in real life. In the repertoire of OR techniques is the method of computer simulation. This mathematical tool consists of the design of a computer model which will represent all the essential elements or parameters in a simulated operation, and calculate the outcomes that would be likely to occur if such an operation were actually performed. The key word here is "essential." Any military commander knows that accidents will happen, equipment breaks down, men get tired and make mistakes, and an infinite number of contingencies can occur. No computer pro-



gram can accurately predict these happenings. Thus, at this point, we must relate the simulation to the particular problem that we want to solve. Only those elements which make a difference in the problem solution need be considered. Since a large number of factors remain the same regardless of which alternative we are examining, the relative performance of the alternatives will not be influenced by excluding them. The basis for ranking the alternatives and arriving at a decision—the primary purpose of the simulation—is still intact. In the Trans-Hydro Study, when evaluating different fleets of craft, numerous factors—for example, the performance of the men under fatigue and stress—would seem to remain the same no matter what type of craft is being considered. Naturally, such an assumption needs to be checked by further analysis and military and technical judgment. By excluding such human factors, a computer simulation becomes feasible to evaluate the relative performance of the alternative craft fleets. Decisions as to what are the essential factors can best be made jointly between the transportation analysts (model-users) and the operations research experts (model-builders).

Just as we consider only the essential elements in the simulation, we similarly calculate only those outcomes or results of the operation which are relevant to the problem at hand. We must define the "measures of effectiveness", a set of numbers to be used to represent the worth of an alternative system. These quantities are output by the simulation. For Trans-Hydro, a LOTS system is judged according to how well it performs the mission; hence, an important measure of effectiveness is the productivity of the particular craft fleet, or the time required to complete the

mission. Another important output is the degree of use of shoreside supporting resources.

After determining the essential factors, designing the model and identifying the measures of effectiveness, the simulation must be validated. To do this, the transportation analyst defines a few alternative systems for which he has knowledge of the performance of in real life. He then observes the results of the simulated operation, compares it to actual operations, and uses his military judgment to decide if the model simulates reality to his satisfaction. If not, we must go back through the process, reevaluate what we judged to be "essential" factors, and modify the model accordingly. It should be noted that when a validated model has been constructed, it is available for general application as a tool for any study having similar requirements.

In the model application phase, the transportation analyst is now free to specify any reasonable alternative system, input it to the computer, and see how well it does. When evaluating the results, he must be aware of the limitations (i.e., the excluded, "non-essential" elements of the model, which should be *explicitly* and openly stated when it is designed. For example, in the Trans-Hydro model the availability of beach unloading sites was simulated, but we did not simulate the degradation of a LOTS operation which inevitably occurs when the unloading operation at the beach becomes congested—that is, when too many craft are being unloaded in a limited space. The analyst must recognize this and specify the number of sites that could be used in an effective operation where congestion is not a limiting factor. In other words, rather than blindly applying the model, he must specify only those alternatives which in his judgment have a good chance of efficiently performing the operation.

Finally, the model-user must balance the effectiveness of each alternative with its cost. The simulation has provided a tool, but not a solution to this phase by giving the analyst the means of determining approximately the effectiveness of each alternative. At this point the analyst or the decision-maker must consider questions such as, "how many millions of dollars are we willing to pay for a predicted increase in effectiveness?" In other words, the ultimate responsibility for the evaluation of cost-effectiveness trade-offs still falls to the decision maker.

The problem confronting the Trans-Hydro Study group seemed to fall into this pattern and to lend itself to analysis by computer simulation. The Systems Analysis Group Scientific Services Directorate undertook the task of providing the USACDC Transportation Agency, the customer, with a product in the form of a simulation to help in the evaluation of LOTS operations. From the very beginning, the model was designed with the close cooperation of the two organizations—with the Transportation Agency, as model-users, contributing an intimate knowledge of actual LOTS operations, and SAG, as model-builders, providing the operations research expertise necessary to translate the operation into the systematic description required for simulation.

We began with a hard look at actual LOTS operations in order to find a general framework from which a wide range of operations could be considered. Here we discovered a significant by-product of the model design process. The logistics experts were forced to clearly and precisely define those activities that make up the LOTS mission—a complete examination which resulted in a greater understanding of the interactions of the operations from a systems viewpoint. We determined that the model would provide a skeleton for the operation; the "meat" within the skeleton would be filled with input data, thus, allowing us to evaluate a variety of different craft fleets.

After several attempts, we agreed upon the scenario which is shown in the illustration. The trans-hydro craft move general cargo, containers, equipment, and vehicles (all defined as cargo for the model) from several cargo ships offshore to one of the unloading areas at the shore. For craft that are discharged at the beach or amphibian areas, trucks are used to move the cargo to the inland destination. When all cargo has reached the destination the operation is complete.

The inland destination is a theoretical location which was defined for analysis purposes. From a systems viewpoint, all LOTS systems of all craft modes (surface, air, amphibian) must perform the same job in order to do a comparative analysis. Thus, LOTS systems comprised of amphibious craft and landing craft require a transfer of cargo to trucks to move the cargo as far inland as it will be carried by helicopter. The location of the destination might correspond with the discharge point for helicopters. Basically, the

destination is the point after which all LOTS systems and modes are basically the same—i.e., cargo has been transferred to trucks or has been delivered to the user. In real life, the destination may be a staging area (the user), an additional transfer point, a supply depot, or a point enroute.

The amphibian unloading area is some distance inland, usually 0.5–1 mile. Amphibian craft are discharged at this area in order to (1) reduce congestion at the beach, (2) unload craft on better ground (e.g., ground that is a prepared surface and not sandy as at the beach), or (3) transfer cargo to trucks at an existing road network.

In the LOTS scenario, all trans-hydro craft are initially placed in the ship's queue (a waiting area) for assignment to berths or "hatch slots" at shipside. The ships may be of different type but each type has a specified number of hatch slots to which craft can be assigned. After the craft are assigned to a slot and loaded, they depart to one of the three unloading areas depending upon the craft type. Upon arrival at the shore the craft is assigned to a specific unloading site and appropriate trucks and material handling equipment (MHE) are assigned. If acceptable resources are not available, the craft waits. Once the trucks are loaded, they move directly to the destination, unload their cargo, and return to the unloading areas. When a truck is not available, cargo can be left at temporary holding areas near the beach to be picked up later.

Having defined a framework, we now endeavored to exclude from the model those factors which are not sensitive to the selection of craft —those factors which do not vary with the type of craft being used. In addition, we determined those factors which would be more easily considered by subjective judgment or techniques already available to transportation experts. The Transportation Agency agreed to these limitations and understood that they would have to consider them outside of the computer simulation during the model's application. Since it is important for model-users to know the model's limitation as well as its capabilities, the significant limitations are briefly summarized:

1. Effects of hostile fire are not included within the model. Although some craft are more vulnerable to enemy fire than others, LOTS operations are normally carried out in a relatively secure area, and craft with glaring deficiencies can be subjectively evaluated by military experts.

2. Command and control will always be adequate to efficiently perform the operation. The model-user must be careful to define craft fleets that do not place an unrealistic requirement on the command functions.

3. Maintenance, refueling, and equipment breakdowns must be considered separately. The transportation analyst will reflect the impact of maintenance by determining the percent availability for each craft type. The number of craft he inputs to the model then is interpreted as the number of craft that can operate simultaneously.

4. The environment does not vary significantly during the course of one ship unloading operation. To determine the impact of the environment on the effectiveness of the craft, we will run through the model separately for each environment under consideration.

5. A shoreside holding area, containing craft not currently being used in the operation, is not simulated. The model places all the craft in a waiting area near the ships (the "ship's queue"), and takes new craft from this area only when needed at the ship. Thus, by observing the portion of the time that each individual craft spent in the waiting area, the model-user can determine the time the craft would have actually spent at a shoreside holding area.

6. Cargo is aggregated, or averaged, into modules containing different, but similar, items of equipment or cargo. This reduces the different kinds of cargo to a small enough number to be efficiently handled by the simulation. The aggregation process was performed in the Trans-Hydro Supply Analysis by the USACDC Supply Agency using statistical equations to assure that the cargo modules would adequately reflect the movement requirements of the LOTS mission.

7. Trans-Hydro craft are given three measures of capacity which determine how much cargo they can carry—a weight capacity, a volume capacity, and the amount of available deck space. Cargo is loaded an item at a time until one of the capacities is exceeded. During model validation, we observed that this scheme resulted in realistic craft loads.

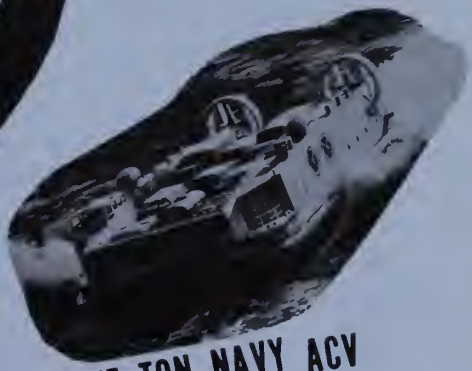
continued page 9

23 TON ACV (TH-E)

300 TON CARGO TRANSPORTER BARGE (TH-D)

?

BDL



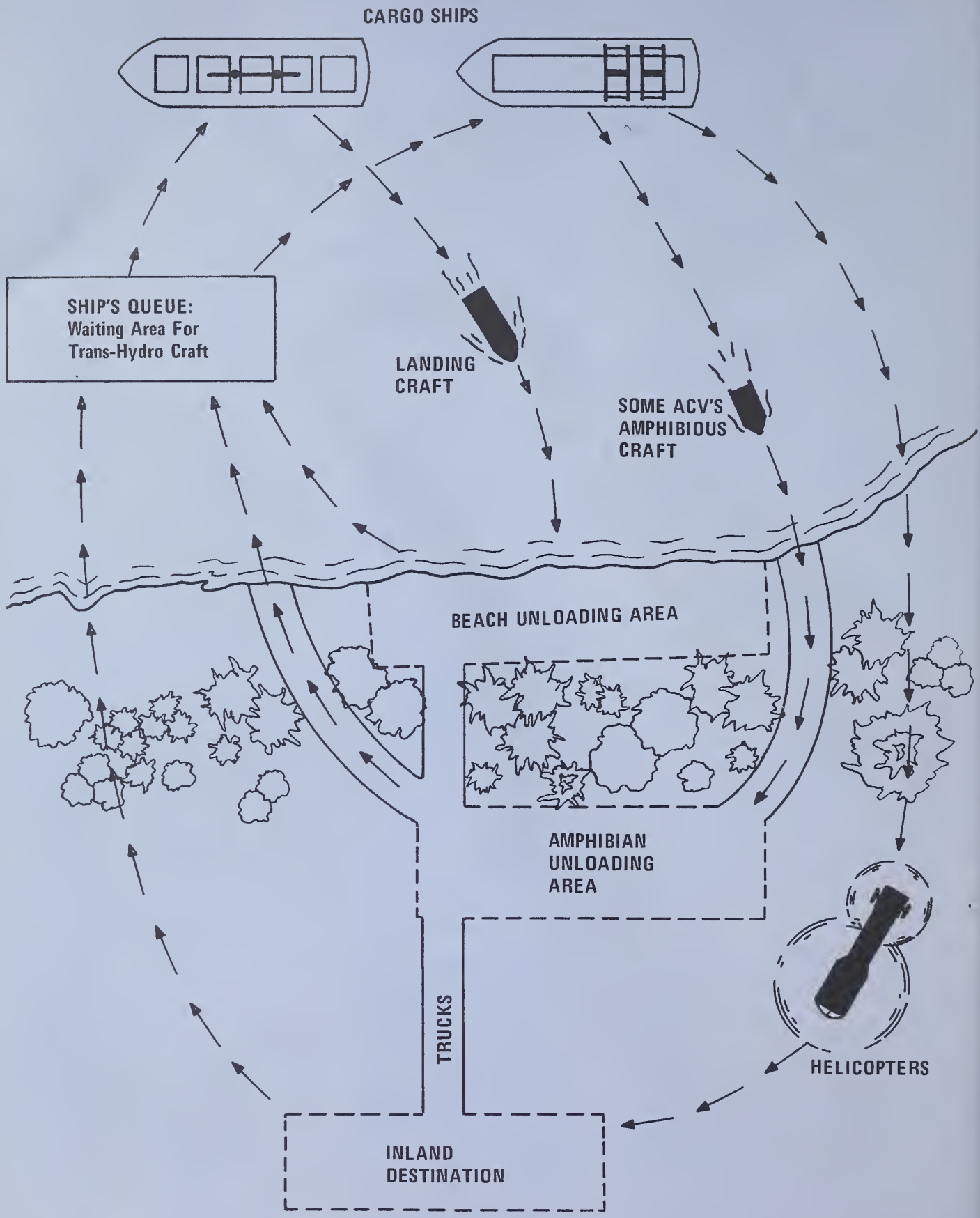
75 TON NAVY ACV

60 TON SEMI-ACV (TH-F2)

HLH

LARC 15

LOTS SCENARIO



The output of a simulation can be no more accurate than its input data. The Transportation Agency gathered input data from numerous organizations in the Army research and development team. The USACDC Supply Agency with the help of the Army Logistics Management Command (ALMAC) performed the Supply Analysis describing the cargo. In the Maritime Fleet Analysis, the SAG Field Office at Fort Lee determined how this cargo would be loaded onto ships to be discharged in the simulated operation. The Mobility Equipment Research and Development Command at Fort Belvoir used their technical knowledge to create conceptual designs of material handling equipment, landing craft, and planning hull craft. At the Air Mobility Research and Development Laboratory, potential air cushion vehicles were designed. Candidate designs for helicopters were obtained from ongoing HLH (Heavy Lift Helicopter) Studies. All these craft became candidates for selection in the Trans-Hydro Study. The Transportation Agency drew on numerous other references at their disposal for the remainder of the data.

This data was compiled for the LOTS simulation and categorized into "performance data" and "variable data." The performance data, describing the capabilities of each type of equipment, remains the same for all operations. It consists of craft speeds and capacities (under various environments) ; cargo transfer times for loading craft at the ship and unloading at the shore; truck speeds, capacities, and use preferences; MHE use preferences; and delay times for mooring craft at the ship. The variable data, describing the particular LOTS operation being simulated, consists of the independent, or input, variables of the analysis—ship types and their loads of cargo (the movement requirement) ; shoreside facilities (trucks, MHE, unloading sites) available; distances involved; environment; and the fleet of trans-hydro craft available to perform the operation. The craft fleet may consist of one kind of craft only or a mix of several different kinds. The analyst may specify exact numbers of craft available, or he may specify only the kinds of craft and let the computer determine the number of each kind utilized.

The computer program for the model was written by the SAG Scientific Services Directorate according to these specifications. This Trans-Hydro Simulation would be an equally effective aid for almost any study involving an evaluation of the logistics systems needed for LOTS and is permanently available. It is written in the FORTRAN IV computer language and is now operating on an IBM 360/65 computer, but it was intentionally programmed so that it may be used on any large computer. Complete documentation of the model's design and use can be obtained from USACDC SAG, Scientific Services Directorate, Fort Belvoir, VA.

To apply the model to the trans-hydro problem, the model-users must specify the possible fleets of craft that can competitively perform a number of different LOTS operations. Since there are some 23 candidate craft which can be combined into an almost infinite number of different fleets, the problem is far from solved. A methodology or a scheme for model application was derived to reduce the number of alternative craft fleets that have to be tried. An alternative fleet would be run through the simulation for one operation in a spectrum of LOTS missions. For each operation, the simulation determines the effectiveness (mission completion time) of the alternative and the resource requirements (craft, trucks, and MHE used). A separate cost model was constructed to calculate the cost of the alternative fleet from its resource requirements. (Details of the cost model may be obtained from its designers in the SAG, Economics and Cost Analysis Directorate.) Using this as a building-block, we broke the methodology into three levels of analysis.

At the first level, fleets consisting of only one kind of craft were evaluated in the discharge of general cargo ships and container ships at a two-mile ship–shore distance with a three–five foot sea condition. The computer will determine the number of craft needed by calling a craft to the ship whenever a berth becomes idle. Prohibitively costly or ineffective individual craft would be eliminated at this stage.

The craft judged to be competitive from the results of Level 1 will be carried to the second level. At this stage the analyst will determine combinations or mixes of craft that he feels will perform the job better than any one kind of craft. For example, he might combine a large

craft such as an LCU, best suited for heavy lift cargo, with a smaller, faster ACV, such as the civilian 23-ton Voyageur, and a helicopter to carry containers. The simulation will still determine the number of craft needed based on the analyst's definition of which type craft is best suited for which ship types and cargo items. The craft fleets with relatively greater cost or lower effectiveness will be eliminated.

In the final phase of analysis only those competitive mixes from Level 2 remain under consideration. In both the previous levels, the shoreside resources and the number of craft available were unconstrained, i.e., the computer determined the numbers required by calling for them on an "as needed" basis. Now the analyst will quantitatively specify the number of craft and supporting resources. No doubt, by reducing the number of craft, we will obtain in some of the fleets a much lower cost at only slightly reduced effectiveness. Similarly, some fleets from Level 2 may require an unrealistic amount of shoreside support. For example, in an actual LOTS operation, the number of beach unloading sites that can be efficiently used is limited by the size of the beach area. For some candidate fleets this constraint may drastically reduce its effectiveness. At Level 3, the fleets of Level 2 will be modified to obtain a LOTS system which is both realistic and efficient (i.e., its available resources are appropriately utilized). If a number of competitive systems still emerge (which is likely), they will be evaluated over a wider spectrum of LOTS missions—with greater ship–shore distances, using roll-on/roll-off ships or Seabees, and under more stringent environments (5′–8′ seas and greater). The craft fleet that is finally recommended will be capable of performing all LOTS operations, and will have a favorable trade-off between its effectiveness and cost.

Even with the simulation and its scheme for application, the decision-making is not easy. The Systems Analysis Group has provided the Transportation Agency with a useful tool for the Trans-Hydro Study, and hopefully for other studies as well; but the decision is still up to the logistics expert. Perhaps all that may be said is that they can make a better decision with the LOTS simulation, and that we have removed some of the guesswork from predicting the performance of logistics systems.

ENGINEERING PRINCIPLES IN TACTICAL COMMUNICATIONS-ELECTRONICS EQUIPMENT

BY CAPTAIN JOHN M. WATKINS

In combat, finding the enemy is half the battle, defeating him is the other. However, a commander's success in both finding and defeating the enemy is dependent to a great degree upon his ability to control or manage his maneuvering forces.

Germain to a commander's control of highly mobile combat forces are fast, efficient and reliable communications. In early 1971, the US Army Combat Developments Command Communications-Electronics Agency (USACDC-CEA), realizing the even greater importance of effective tactical communications systems, especially data communications support, embarked on a developmental course that will play a significant role in the control of future warfare by insuring the availability of reliable, accurate and responsive communications needed by combat commanders.

DEFINITION OF THE OVERALL SYSTEM

The Communications-Electronics Agency's program was initiated by describing its proposal for improving tactical communications in a document entitled "Data Transmission Capability (DATRAC) for the Army in the field."

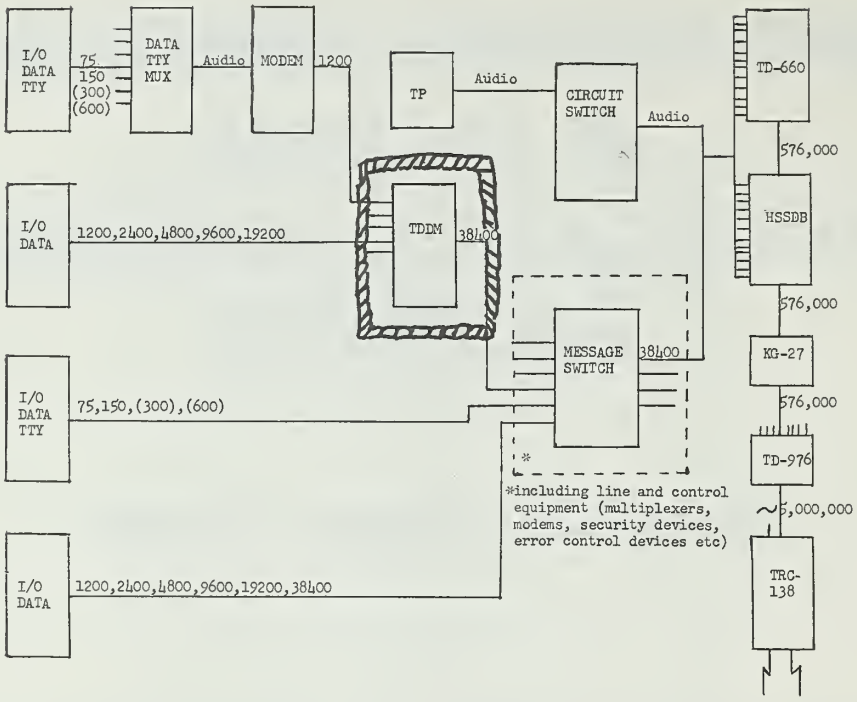
DATRAC, among other things, stated the Army's requirement, in qualitative terms, for a data transmission capability that would provide effective and reliable communications to support the automated data systems of the Integrated Battlefield Control Systems (IBCS). DATRAC also described procedures for automating existing record message services. The technical objectives of the proposal included maximum utilization of micro-minaturized circuitry, universally low power consumption, self-diagnosis for trouble isolation, and long service life components to extend mean-time-between-failure (MTBF), one of the parameters on which equipment reliability is based.

NEW BUFFERS AND MULTIPLEXERS

Having specified the Data Transmission systems parameters needed to support IBCS and its' component subsystems, CEA then proposed the development of various items of tactical data communications equipment to fit those parameters. The first step was to generate a set of Materiel Need documents (each used to state an Army requirement) for a High Speed Serial Data Buffer and a Time Division Digital Multiplexer. These describe the most efficient means of defining and constructing data access "ports" into the Army Tactical Multichannel Communications System (ATMCS). One very important goal here was to maximize communications efficiency without causing present multichannel transmission equipment to become obsolete prior to the expiration of their expected life cycle.

Captain Watkins is currently assigned to the CDC Communications-Electronics Agency, Communications Systems Division, Ft. Monmouth, N.J.

Figure 1. Connection of I/O devices to the Automatic Message Switching Centrals to Provide dedicated loops. The TDDM is being used to multiplex low speed users.



The *High Speed Serial Data Buffer (HSSDB)*, as presently defined, will provide users with the means to transmit high-speed data and/or wide band (secure voice) traffic over equipment of the Tactical Multichannel System at rates of up to 38,400 bits per second (bps) (see Figure 1). The HSSDB will be used at Communications Centers of the Corps/Army Command and Area Communication Signal Centers, Division Command and Common User Signal Centers, and elsewhere in the Army in the Field on an as required basis.

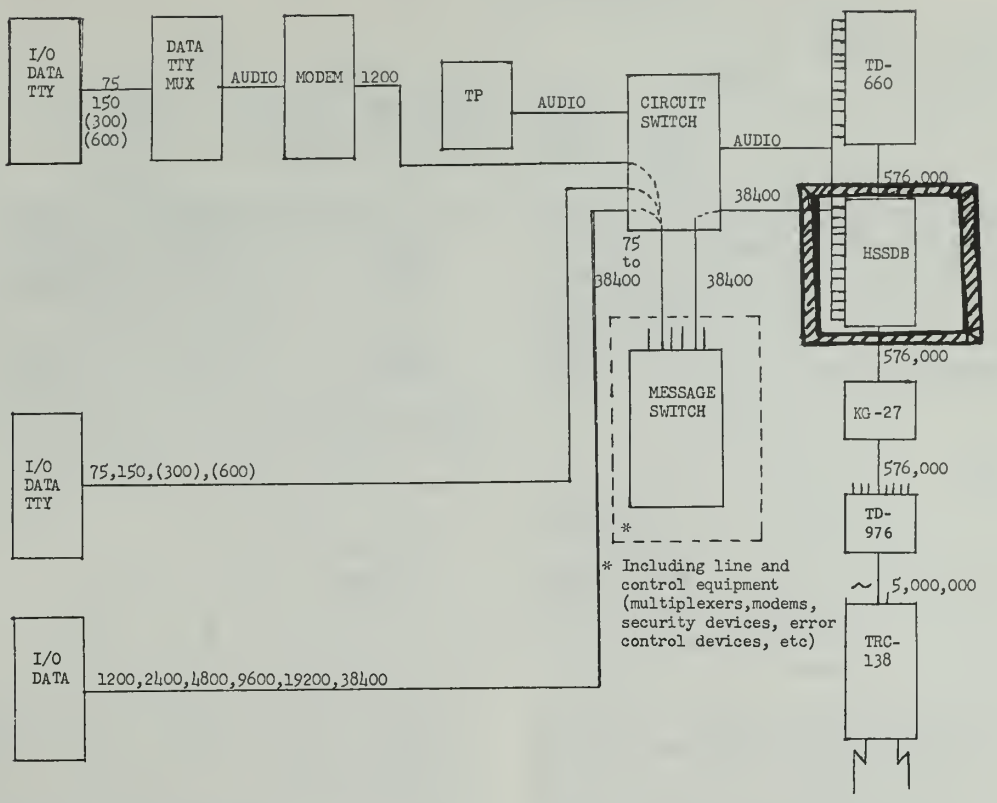
The *Time Division Digital Multiplexer (TDDM)* will be used to combine the data traffic inputs of various slower speed data terminal equipments into more economical single serial (38,400 bps) bit streams that will access the Pulse Code Modulation (PCM) transmission system through the High Speed Serial Data Buffer (see Figure 2). Additionally, the TDDM will be used independently of the HSSDB as a means of economically transmitting multiplexed signals directly to another TDDM.

Once the proposals to improve the capability of the transmission system (ATMCS) to handle data up to 38.4 kbps had been provided, CEA defined and described a series of data switching and data terminal devices. These devices include a Modular Message Switching Central, expandable Data/Teletype Terminals and a Family of Input/Output Devices (see Figure 3). Proposals for these devices take maximum advantage of projected state-of-the-art technology by specifying maximum use of solid state techniques such as large scale integrated (LSI) and metal oxide silicon (MOS) circuitry. It is intended that the versatility inherent in use of such techniques will permit the devices to be designed and employed as basic units, modularly expandable for use throughout the Army. Such universality will permit reduced acquisition, training and logistics costs as well as increased maintainability and operating uptime.

SWITCHING

Present tactical message handling procedures are manual and, as such, are necessarily slow and frequently inaccurate. The CEA proposal for an *Automatic Message Switching Central* is intended to alleviate this deficiency by significantly reducing traffic handling time through increased transmission speed, elimination of manual intervention in traffic handling as well as measurably decreasing message error rates. The switches, replacing torn tape relays, will permit significant reductions in numbers of vehicles and people as well as in operations and maintenance costs. Additionally, the Proposed Message Switching Central will enhance efficient use of transmission facilities and will provide accurate managerial records of processed traffic without storing the traffic at each node.

Figure 2. Connections of I/O Devices to the Automatic Message Switching Centrals to Provide Dial-up service. The HSSDB is used to provide 38400 BPS ports vis the TDD 660.



NEW TERMINAL DEVICES AND ASSEMBLAGES

The most recently completed segment of the CEA proposal for improving overall tactical communications is that portion which specifies a Family of Input/Output (I/O) Devices and describes performance requirements for Data/Teletypewriter terminals.

The requirement for an improved message switching capability was defined and described by the Message Switching Central MN document; however, there still existed acute inadequacies in the ability of tactical communications supporters to provide flexible and responsive message processing to the tactical commander. Realizing this inadequacy, CEA proposed an improvement in the generation and processing of data and teletype traffic. The proposal was specified in a Materiel Need document for Data/Teletypewriter Terminal assembles which are to be modular in design using the standard I/O devices described below.

The Proposed Data/Teletypewriter Terminals will be deployed throughout the field and theater Army areas to provide an improved record message terminal facility for traffic generated at message centers (concentration points), from automatic data processing systems (ADPS) and from individual teletypewriter or data users. In addition, the Data/TTY terminals will provide compact record storage of message transmission and receipts in significantly less space that at present with greater accuracy and accessibility. It will also provide faster service and retransmission capability when compared to present hard copy storage facilities.

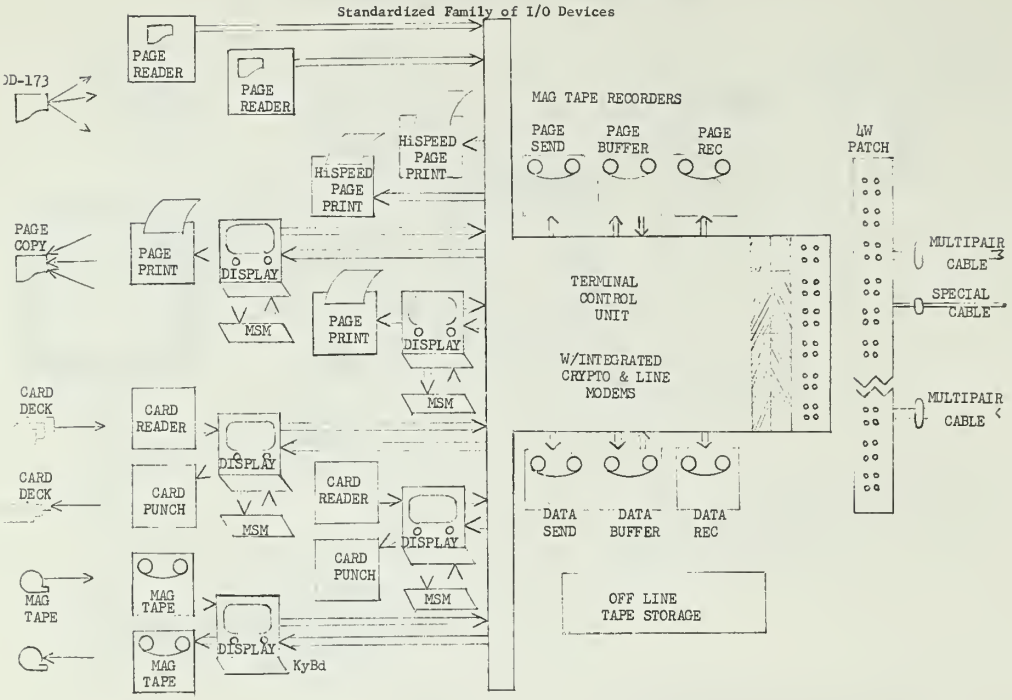
The Proposed Family of I/O devices is designed for optimum flexibility through commonality of individual components with provisions for expansion through addition of modular components. Members of the proposed tactical data I/O device family include a Page Reader Module, Page Printer Module, Electronic Message Display Device, Message Storage Module, Magnetic Tape Storage Device, Electronic Control Unit Module and a Data Card Device, should the latter be needed.

The tactical Page Reader Module will reduce significantly message handling times associated with the processing of tactical traffic by permitting rapid input of information in message form (typed page) for direct transmission via the Army Tactical Multichannel Communication System at speeds up to 2400 bits per second. This method of injecting traffic into the ATMCS will abbreviate the need to prepare messages manually for transmission as required in current

Figure 3. DATA/TELETYPEWRITER TERMINAL (LARGE)

A TYPE CONFIGURATION using devices from the

Standardized Family of I/O Devices



paper tape and data card processing systems. In addition, the Page Reader will be used by selected high volume subscribers who require direct access to and from automated data systems and will insure that input means are compatible with the speed and efficiency of the overall transmission system(s).

The tactical Page Printer Module will be a lightweight device that will facilitate the reception of formatted message and data traffic at rates comparable to those of the Page Reader Module. The Page Printer, when used with the Proposed Page Reader Module, will provide a basic Input/Output capability similar to but a good generation ahead of present teletype equipment. Additionally, the Page Printer may be employed as a remote output device for high speed computers and, as such, will significantly reduce the time processors are busy due to excessive transmission times.

The proposed tactical Electronic Message Display Device will provide users with the capability to receive and transmit displayed text at speeds up to 2400 words per minute. It will be a high speed multi-purpose device which will be a major operating component of on-line and real-time data processing systems such as the Army Tactical Operation System (TOS) (TOS is to be an automatic tactical information processing system that will accept inputs on a near real-time basis for decision and/or dissemination in tactical areas such as operations, intelligence and fire support). The message display terminal device will enhance the overall efficiency of the communications system and systems such as TOS by providing a capability to assemble, edit, enter and receive message traffic with minimum manual intervention. The display, which will probably use either Liquid Crystal, Plasma or other sophisticated "flat-plate display" technologies, will also be capable of providing hard copy printouts through linkage with the proposed Page Printer Module. It will, in addition, have a limited built in storage and processing capability of its own which will permit its use as a small scale independent processor.

The proposal for the tactical Message Storage Module (MSM) outlines a requirement for a temporary means to store (electronically) and retrieve message information for composition, modification, display, printout or transmission. Additionally, the proposal specifies a requirement to provide a buffering capability between I/O devices and automatic data processing equipment. The module, in its primary role, will augment the storage capability of the various Input/Output devices of the Proposed I/O Family. The Module, as proposed, will be configured as a basic storage unit of specified minimum capacity and will be capable of being expanded by adding additional modules when required. To insure maximum efficiency in message processing, the MSM will be capable of processing precedence traffic in accordance with applicable standards for message processing.

Long term storage, including historical records, within the Proposed Family of I/O devices are provided for by a *tactical Magnetic Tape Storage Module* (MTSM). The MTSM will be a lightweight electro-mechanical device using cartrige magnetic tape as a medium for processing, transmitting, recording and compact long term storing of message/data information. The MTSM will permit incoming or outgoing messages to be recorded and held for display, printout or transmission at speeds up to 2400 bits per second. The MTSM will also be capable of operating in automatic data processing systems operating at speeds of up to 38,400 bits per second while processing on or off-line magnetic tapes. The unit is to be modular in concept with a basic tape unit and associated logic. Expansion will be accomplished through the addition of add-on module appliques consisting of a keyboard and display (components described above) with associated tape processing logic.

The capability for Combat Service Support (CS_3) users to process traffic normally associated with logistical, personnel and administrative functions will be provided for by *tactical Data Card Devices*. These devices will be capable of operating in the lower echelons of tactical environments providing a punch, print and read capability for transmission and reception of data traffic at speeds up to 2400 bits per second (200 cards per minute). Those functions peculiar to card processing, off-line punching, stacking, sorting and verification will be provided for by the Data Card Devices.

INTERNAL CONTROL

Because of the diversified functions which must be performed in present and future Communications Centers (i.e., processing card, tape, hard copy as well as displaying information), communications control is and shall continue to be most important. The proposed family of tactical I/O Devices recognizes the need for and provides communications control through the use of a *proposed Electronic Control Unit Module.*

The control module will be capable of generating and recognizing the unique control required for efficient use of communications channels. The control module will be used by operators to coordinate the operation of associated I/O devices. It will monitor the status of each controlled I/O device (e.g., operational, inoperational, in use, or available) and direct traffic accordingly. Via the aid of the Message Storage Module and associated logic of the Control Module, it will be possible to store traffic destined for I/O devices that are not immediately accessible for whatever the reason. Once the I/O device becomes available for traffic processing, the Control Module will then route its waiting traffic according to precedence.

MAXIMUM USE OF AVAILABLE FUNDS

The CDC-CEA evolutionary concept for communications improvement is a continuing effort with the objective being to provide the most efficient and cost effective communications support possible, consistent with state-of-the-art techniques and doctrinally established principles.

The CEA approach has taken and will continue to take maximum advantage of existing communications facilities by first, improving the capability of existing equipment and second, combining those improved capabilities with state-of-the-art engineered components or modules. Through this approach, it will be possible to extend the life cycle of existing facilities while providing an improved service with the final product being *EFFICIENT, RESPONSIVE, COST EFFECTIVE COMMUNICATIONS SUPPORT* to the tactical commander.

COMBAT INTELLIGENCE, A FUNCTION OF COMMAND

BY MAJOR THEODORE D. MASON

"The basis of political and military action is intelligence. Total war and modern weapons make intelligence more important than ever before."

This statement by Canadian Minister of National Defense, Brooke Claxton, in the late 1940's, remains true today. Yet, intelligence today is among those concepts most misunderstood.

The US Army, in schools, in literature and in practice, attempts to drive home the point that intelligence is the tool of the commander, works to serve the commander, and is the responsibility of the commander. Intelligence people are employed by the commander just as infantry battalions are employed by the commander to further the accomplishment of his mission. The failure of intelligence as with a failure in planning is the commander's failure; there is no difference between a G2 and any other staff officer. He is the commander's staff officer and it is the commander's responsibility (not his) to produce good intelligence.

There is no magic in the production of good intelligence. It comes about through the application of resource management principles and the subjective evaluation of all-source information by trained and experienced intelligence analysts. That is the *only* way it comes about.

Combat intelligence is defined in FM 30–5 as the knowledge of enemy, weather and terrain required by the commander to plan and conduct tactical operations. It may be obtained from within his own command, from higher commands or from adjacent commands.

Intelligence operations and tactical operations are interdependent. The writer of the operations order and the manager of the intelligence operation must work as one if the operations order is to reflect the intelligence available and profit from enemy vulnerabilities.

The tenet concerning the responsibility of the commander for production of intelligence is usually recognized; however, precisely what and how much intelligence he needs and how it is obtained is not always so clear in the commander's mind. Most importantly, he must know what he may demand of his intelligence officer and recognize that there is no handy-dandy, easy method for measuring intelligence output. The counting of bullets or bodies or area held or taken will provide an acceptable scale of measure for combat arms, but no such tangible unit

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of measure is available for the intelligence function. The commander must evaluate his intelligence effort in the light of his successful combat operations. To the extent that the intelligence estimates included in the operational planning were valid and useful, the intelligence effort must be judged successful.

Doctrine tells us that the product of the intelligence function can never be more than an expression of enemy capabilities and vulnerabilities. While this is true in the strict sense, much can be done to remove the sense of vagueness that often obscures the meaning and value of the intelligence offered. At the very least, fact, assumption, and theory or estimation must be plainly labeled, and the enemy's possible courses of action stated positively. A weak G2, wary of the responsibility a clear cut estimate places on his shoulders, may write one that will be generally correct no matter what happens. The commander must know when he is being offered a bad estimate.

The intelligence estimate is the major product of the intelligence effort. The planning and management, collection and processing of information are all dedicated to this end. Information and intelligence from whatever source is evaluated in the light of all other available information and intelligence to determine if it is applicable and useful; that is, if it concerns the situation at hand, and if it increases the knowledge and understanding of that situation. It is apparent that information and intelligence flow must be omnidirectional so that all available data may be considered.

The duties and functions of the intelligence officer (G2) require approximately six pages of print in FM 101–5,*Staff Organization and Procedure.* The military intelligence organization was provided to accomplish the intelligence function under the direction of the G2. It provided for collection through human intelligence assets, (CI and IPW), and for processing by imagery interpretation and order of battle sections. The planning, management and dissemination functions were handled by the G2's organic assets. A quick look at the TOE strength of the division G2 shop, compared to the aforementioned six-page layout of G2 functions, will relieve the mind of any doubts about the adequacy of the military intelligence organization (MIO) at the division level—it can't do the job! At brigade and battalion levels there is no MIO at all! Yet, the greater volume of information is collected, undegoes partial processing and is disseminated at these echelons. This is, of course, in addition to its primary use by the S2 in writing his estimates.

The best craftsman cannot do his job without adequate tools. The commander finds himself in the position of the craftsman without tools. The intelligence effort suffers from the lack of assets and the product is degraded. In striving for accuracy and completeness, timeliness may be sacrificed; or perhaps accuracy may be traded for time. In any case, a dangerous situation can easily develop.

The commander (and his "2") must have the proper tools in the right amounts to do the job, to carry out his intelligence responsibility.

There is a proposed MIO to help the commander produce good intelligence. The concept of operations and the assets provide for management and planning, collection, processing and dissemination, all without straining the TOE assets of the division, yet covering all echelons. Intelligence doctrine remains essentially unchanged; and contrary to the fears of many, the commander's authority and responsibility are neither challenged nor changed.

Today, information, screened for usefulness, is digested by the collecting echelon and simultaneously sent up the chain to the next higher echelon and all other interested parties. This is usually done by means of a spot report, a simple note of detected phenomena that is recorded because it may aid in understanding the situation.

On the other hand, intelligence—information which has been processed—is prepared in the form of estimates and intelligence reports of various kinds and forwarded with the commander's approval through command channels. Under the proposed system employing the Battlefield Information Coordination Center, there is no change in this method. Information is still disseminated in the same manner and so is intelligence. The change lies in the organization and assets of the new MIO. The G2, who will direct the MIO, will have at his call, aerial and ground surveillance assets and an intelligence coordination center with trained military intelligence personnel to perform the management functions, analysis, production and dissemination he requires.

In short, the commander is given the tools he needs to fulfill his responsibility for intelligence.

PROJECTING THE ARMY'S NEEDS . . . WANTS . . . EXPECTATIONS . . .

THE SEVENTIES SOLDIER

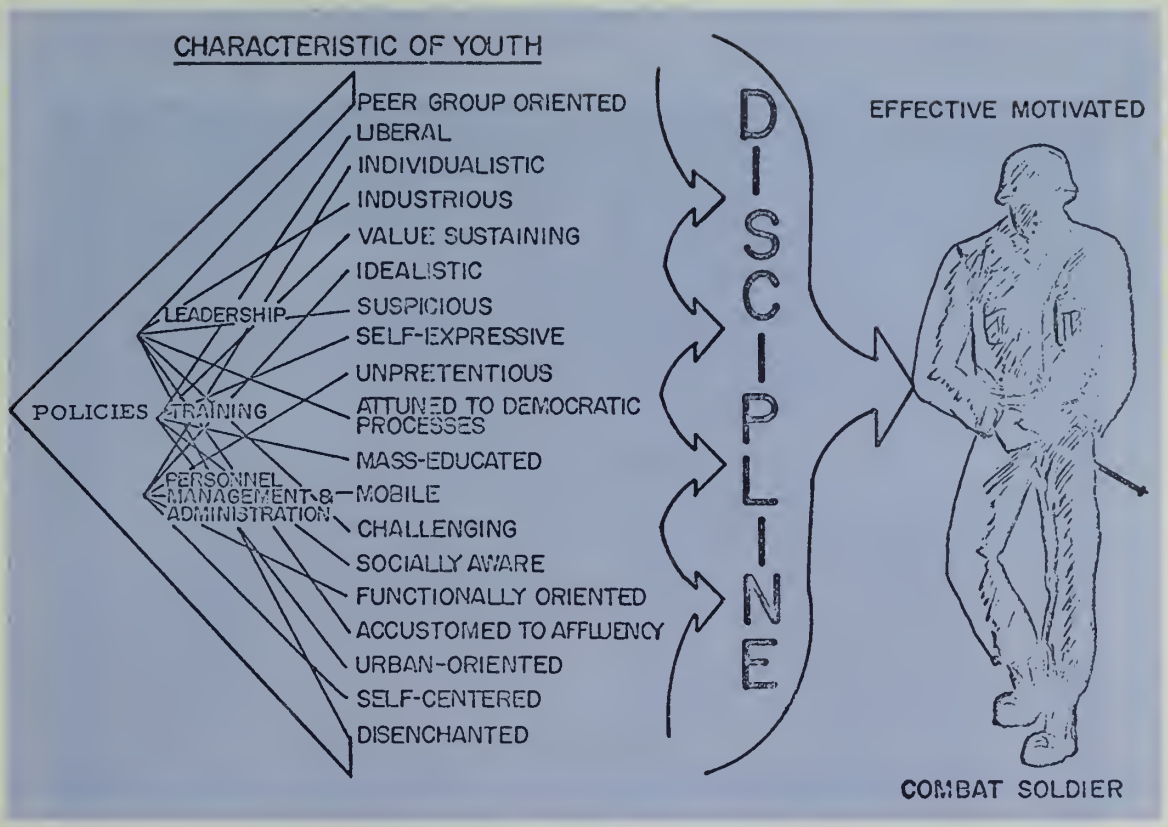
With VOLAR ended and just ten months left to reach zero-draft, introspection is out and *action* is "in" for rejuvenating and professionalizing the Army.

And since the Army is first and last a *human* endeavor, the action these days is with CDC's "People people", the Personnel and Administrative Services Agency (PASA) at Ft. Benjamin Harrison, Indiana.

Their work-formula is simple: focus on the Army's most valuable resource—the individual Soldier. Because to understand and appreciate him and to relate meaningfully to his personal and professional needs are the final ojectives of any modern Army personnel management system.

Such a system has thus far remained illusive (or illusionary) because, it is felt, personnel doctrine was either lacking or was fragmented in development. So that the Army may someday fill these doctrinal voids, CDC was given the task of doing a major Army-wide study of the personnel field in 1971, the first phase being called the "Personnel Offensive".

This phase, completed by PASA early this year, identified the personal and social characteristics of American youth in the 70's and led CDC's "People Agency" right into the next phase of this major study undertaking called "The American Soldier of the Seventies–Phase II". This means a look at the Soldier now in



the Army, the Soldier the Army can expect to attract, and the Soldier the Army needs.

PASA's study team will look at the Soldier as an individual, a composite of attitudes and characteristics, and also as a participant in a career field such as Combat, Technical, and Administrative.

But "Soldiers-as-people" will get PASA's attention first—and last, because one product of the study is expected to be a "user's manual". This will crystalize and direct the data toward the goal of the study—getting the most out of every man.

The study is based on the decision to operate the military personnel system in a draft-free environment, a major challenge to personnel standards. The quality of the American Soldier in the 70's has been considered an important factor in decisions in such areas as pay and financial incentives, personnel management, and human relations (race, drugs, and discipline).

The study is required to develop a common set of qualitative "profiles" and projections of the individual and the job for the next few years. The profiles will give the Army a picture of what it wants, needs, and can reasonably expect to attain.

"Some segments of our public have lost sight of the role of an Army in a Democracy. They see us as being in the killing business rather than as a national institution designed to preserve the peace.

MOTIVATIONAL FACTORS

(1) Discipline
(2) Training
(3) Belief in Cause
(4) Group Solidarity
(5) Leadership
(6) Mission
(7) Military Peer Group
(8) Recognition
(9) Religious Attitudes and Beliefs
(10) Pride
(11) Initiative and Desire to Win
(12) Social Environment
(13) Public Support

STRESS FACTORS

(1) Fear and Survival
(2) Moral Code
(3) Intelligence
(4) Constraints
(5) Drugs and Alcohol
(6) Boredom and Inactivity
(7) Family Influence
(8) Weather and Terrain
(9) Health-Physical Fitness
(10) Fatigue

SUPPORT FACTORS

(1) Weapons
(2) Equipment
(3) Supplies
(4) Reinforcement
(5) Living and Working Conditions
(6) Food
(7) Medical Support
(8) Administration

The study analysis will use the individual and career profiles as a base to examine the environment of the Army of the 70's, if they can pinpoint those problems to be encountered in matching our manpower resources with the requirements of the Army through 1976. This will require a clear look at current personnel policies and procedures.

The search for meaningful and valid data is now underway at PASA. Every available statistic, prior study, survey and article, as well as the professional opinions of knowledgeable people, both military and civilian, young and old, are being sought.

The PASA study team will review available DA information on recently completed Army volunteer studies, surveys, and related data on trends in enlisted qualitative factors: demographic and attitudinal. A field survey of CONUS and overseas installations will also be conducted as a basis of research verification and as a supplement to information sources.

What does PASA hope to accomplish in the "American Soldier of the 70's" effort? Certainly the Army, as an "employer", must demonstrate genuine interest and concern for the individual and his problems. The Army necessarily will be concerned with the individual Soldier's personal development, his motivation, his abilities, his job satisfaction and his overall welfare. Human factors considerations must be applied to all future personnel policy developments.

On the other hand the accomplishment of the Army's mission requires that every individual Soldier contribute to it's attainment. But mission accomplishment should not be achieved at the expense of morale, common sense or discipline. In all that is done, the Army must show respect for capabilities. By giving a full measure of consideration to these personal needs, each Soldier can be made to feel he is an important part of tomorrow's "Professional Army Team".

"Because of the uniqueness of individuals in this changing society, the task of fitting the man to the job may not always be the best solution. In some cases it may be necessary to fit the job to the man."

"The Soldier basically respects demonstrated ability. But he withholds his respect for persons of vested rank until they have proven themselves."

"The young man is liberal—more open-minded than his elders—perceiving a greater need for change. All this is tied in with his somewhat suspicous and idealistic nature."

PASA's

SOLDIER-70 Study Group

Chief:
LTC Ross D. Montgomery

Career Profile:
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MAJ Donald L. Johnson

Soldier Profile:
2LT David D. Scott
2LT Phillip Perkins
SGM Robt R. O'Conner

REVIEWING FIELD MANUALS . . . WRITER'S POINT OF VIEW

BY ROY ROGERS

How many times have you heard people gripe and complain about the content of certain field manuals; for example, incorrect or outdated information, insufficient data, poorly written material, etc?

In this same respect, how often have you seen a person do anything about it? Individuals may actually make written comments on field manuals any time they desire. AR 310–3, Preparation, Coordination, and Approval of Department of the Army Publications, makes this provision in that it directs that all manuscripts have the following statement included in the preface, or in an introductory paragraph: "Users of this publication are encouraged to submit changes and comments to improve the publication." AR 310–3 also directs the field manual writer to send his publication out for a field review. This provides selected reviewers a privileged opportunity to make comment before the manuscript is published.

A field manual writer may spend anywhere from 6 to 12 months developing a new manual or revising an old one. Although the writer is normally an expert in his particular field, he may—

—Overlook an important item of known doctrine.

—Be unaware of a new practice, method, or procedure being used in the field which, if proven sound, could become Army doctrine.

—Include fragmented material of a subject in which he has a working knowledge, but which is not his specialty.

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For these very reasons the writer is required to send the draft manual out to all interested agencies, usually to the command or battalion level, in the continental United States and overseas for a field review. He expects the publication to be reviewed at these levels of command, and hopes it will get down to the company level.

The writer expects to receive comments, and if he does not receive some comments he may feel the manual has only been *rubber-stamped,* and not reviewed. Whereas the writer tries to write in the area of his expertise when developing the manual, he also expects reviewers to comment primarily in their field of expertise.

The US Army Combat Developments Command recently initiated a program to update and modernize Army field manuals. Although many fine, worthwhile comments were received, an in-house review of field manuals prepared by the Transportation Agency to date and forwarded for field review indicates—

—A very small return of comments on draft manuals sent to field units overseas.

—A large number of comments were editorial in nature.

—Other comments were based on minor differences of opinion or wording, and were not in the field of expertise of the activity making comment.

—In many instances, the specific comment was not submitted in the form of a recommended change as outlined in paragraph 1–8, AR 310–3.

Dwelling on the first point, *small return of comments from field units,* the writer solicits and wants these comments. These comments should come from the operating units in the field, as it is these units for whom the manual is written. It is understandable that these units probably have less time for the review and little help available to prepare the comments. Recognizing this, the reviewing activities are given a specific period of time *after date of receipt* in which to complete the comments. The number of days for review is based on the size and nature of the draft manuscript as prescribed by AR 310–3.

On the remaining points, these basic precepts should be observed by the reviewer when reviewing and submitting comments on field manuals:

—Carefully read the purpose and scope paragraphs of the manual. This will help in evaluating the manuscript content and in formulating effective, constructive comments.

—Do not be an edit clerk. If the meaning of the material is clear and correct, do not become concerned with punctuation, paragraph numbering, spelling, and the like, unless such errors obviously change the intended meaning. An editorial review of the manual is conducted prior to final printing.

—Base comments on fact—not on minor differences of opinion or wording. Opinions are debatable, but facts are accepted. Provide the source of the stated fact by a concise reference so that it may be easily verified. Commenting in your own area of expertise should reduce opinion-type comments.

—Do not indicate errors without correcting them. A worthwhile comment takes the form of a recommended change. It should show exactly what is meant and avoid allegation of fault. A brief explanation of the recommended change should always be included.

—Reasons such as accuracy, clarity, correctness, and completeness are unsatisfactory explanations. These reasons fail to tell the writer why the suggested change is more accurate, more clear, more complete, or whatever.

—Finally, submit comments on a DA Form 2028, Recommended Changes to Publications. Chapter 1, AR 310–3, provides guidance for the use of the DA Form 2028 in commenting on manuscripts. Some administrative points that should be observed in preparing comments are—

—General and specific comments are numbered consecutively.

—Deleted material is shown inclosed in quotation marks when it is a part of a paragraph or subparagraph.

—Added material is underlined.

—The date, subject, and agency preparing the comments will be shown at the top of each page of comments.

If the above administrative procedures are followed, with comments factually supported, the reviewer can be sure his comments will be given the utmost consideration, regardless of the writer's point of view. Should the writer disagree, the comment must be forwarded to his next higher command for resolution as an unresolved comment.

SPEEDING THE VOICE OF COMMAND

BY CAPTAIN STEPHEN P. DOWDNEY and CAPTAIN BURTIS G. PARCELS

In an era of deterrent motives, military actions and counter-actions, inter-continental ballistic missiles, and insurgent movements, the need for reliable near-instantaneous communications becomes imperative. The control that a national military command structure can provide to its internationally positioned forces will ultimately determine the fate of that nation.

President Nixon portrayed the critical role of communications in our National Defense when he said, "When a war can be decided in twenty minutes the nation that is behind will have no chance to catch up." It is therefore imperative that a nation with globally deployed forces use the message as the vehicle for command and control. The Department of Defense has recognized the criticality of timely message transmission. Several programs have been initiated which will provide increased modernization to the message processing facilities in all military services. The Department of Defense conducted a study to improve the message processsing system. This study group observed that there were areas of duplicated responsibility within the existing system. A more flexible message handling system. with less chance for human error was needed—a system under one man's central control. One means of accomplishing this was to combine the function of the message center and communications center, and call the resulting conglomerate a TCC or Tele-communications Center. This TCC would be the responsibility of one C–E officer. As a result, directives were sent out from Department of the Army stating that this integration would be accomplished as soon as possible in both TBA and TOE organizations.

Combat Developments Command also realized the necessity and urgency for prompt, efficient message processing. As the planner and designer of the Army of the future, CDC was the logical choice to conceive, develop and initiate whatever changes would be required. One end result of the gargantuan CDC effort is the realization and implementation of the integration of the communications center and message center functions, into one, highly efficient, rapid, and improved facility—The Tele-communications Center (TCC). With this integration, message processing functions will be considerably streamlined, thereby providing greater speed and efficiency in message transmission. No longer will there be the traditional split in message handling responsibility between the AG operated communications center. All processing functions will be handled by one integrated facility under the responsibility of a single staff officer.

Two separate integration programs were developed—one for TDA organizations and one for TOE organizations. TDA unit integration began immediately and is now essentially complete. The Army telecommunications center at the Pentagon, for example, presently represents the goal towards which the Army is striving. It depicts total integration of the old message center and communications center, and is a functional and efficient facility. At this time it is more than 90% automated.

The authors are currently assigned to the CDC Communication-Electronics Agency, Ft. Monmouth, N.J.

At this facility, a message is automatically received, logged, and routed if there is an attention line included within the message heading. If there is no attention line, the message is routed to a duty officer at the TCC to determine action addressees. After this determination, the message is either placed in a distribution bin or, for high precedence traffic, a phone call is made to the action and/or information office alerting them to traffic for immediate pick up. When picked up, the addressee signs for the message and the process of message handling ends. If additional distribution is necessary, it is the responsibility of the addressee for that distribution.

The sequence for outgoing traffic is similar. The writer or drafter of the message must have his traffic approved for transmission, usually by the principal staff officer for whom he works. From this point, it is the originator's responsibility to insure delivery to the TCC for transmission. The message is either delivered to the TCC through the distribution service, or hand carried by a representative of the drafter's office. Once delivered, the message is handled by precedence in the order of being received. It is logged, processed, and retyped for transmission. By integration of message centers and communications centers, the time required to process even routine messages is reduced.

Further reduction of handling time in the TCC has been brought about by new, computerized, automated systems that have the capability of near instantaneous communications when required. The average time required to receive, process, and have a message prepared for pickup is less than two minutes. Still message delivery continues to be a problem. Messages placed in a distribution system are subject to delay or even loss. Telephonic notification of high precedence traffic places the burden of responsibility on the action office, but does not guarantee rapid delivery. Department of the Army Regulations require that routine and priority messages be delivered at least once every two hours, and immediate and flash messages as quickly as possible. Manual delivery methods simply do not allow conformance with the regulation. Electrical transmission is the ultimate solution.

The United States Army Combat Developments Command has been developing a concept plan for the integration of functions in all TOE

units, part of which calls for elimination of the staff message center. CDC proposed that all functions previously handled by the staff messag center and the communications center will be centralized at the TCC. The plan calls for the writer or originator to assign the outgoing message a date-time group and then deliver it to the TCC. The TCC then logs, processes and transmits the message. Once the message has been transmitted, notice of transmission will be furnished to the originator by means deemed appropriate by the commander. It will be the responsibility of the originator to provide any necessary intra-office distribution. With this change, there is a considerable shift in responsibilities from the message center to the originator.

The CDC concept for incoming traffic proposes two sets of alternatives for the processing and delivery of incoming messages. The first set involves message processing, where the TCC determines the action routing within each of the sup-

porting headquarters. For example; if a message is transmitted to CG, 1st Air Cavalry Division (Airmobile), the supporting TCC will determine what staff element, such as the G–3, is to be the action office, and will deliver it to that office. The alternatives also involve routing of message information copies. The information copies discussed here are not the information copies in the address lines of the message, but refer instead to information copies to be distributed within the addressed headquarters, whether it actually be a TO or INFO addressee. The alternatives allow either the TCC, the action officer, or the distribution center the responsibility of reproduction and distribution of the message. Each of these alternatives involve trade-offs in personnel and equipment between the TOE's involved.

The second set of alternatives involves message delivery, a major problem if responsibilities are to be centralized. Regulations require that messenger runs be made at least once every two hours, for routine and priority traffic. Higher precedence traffic must be delivered immediately after it is received. The major problem is lack of personnel presently autorized in TOE units to accomplish message delivery. Electrical delivery presents the only sure solution to the problem, for in an area communications facility, supporting units within a 30 or 40 square mile area, the problem becomes severe. Current doctrine requires that the supported units provide their own courier service but experience has proven that excessive delay is inevitable with this arrangement. Tasking the C–E officer with this requirement is an effective means of centralizing responsibility, as well as expediting delivery. However, it is an expensive solution, since it requires a substantial increase in manpower for the area TCC. An alternative solution would provide over-the-counter service and require the supported units to pick up traffic for delivery. For high precedence traffic the unit will be notified telephonically that traffic is awaiting pick-up, thus the burden of responsibility rests with them. Still, this method provides only slight improvement to present procedures, and messages can continue to be delayed. As stated above, the only true solution is maximum utilization of electrical transmission to supported units.

These improvements, enhanced by other CDC plans for automation in the future, will expedite and streamline the communications system, not only within the Army, but throughout the Department of Defense. The delays inherent in the old message center/communications center will disappear, and the overall responsiveness of our communications system will adequately support our globally deployed forces.

Within the past four years incidents of major international proportions tested the communications structure of our national defense and pointed toward the need for message processing improvements such as this integration effort. In some of these incidents either the speed of our message processing or the failure of highly trained personnel, proved our communications structure neither swift nor accurate enough to cope with critical situations. The situations ultimately resulted in international crises directly affecting American servicemen around the world.

In some of these incidents messages were misrouted necessitating readdressing and retransmitting the message. This process caused delays of up to 14 hours on immediate precedence messages. In one case a retransmitted message was misrouted to an addressee who filed it without action. In other instances flash precedence messages were delayed for almost three hours (18 times the time limit established by DOD). Due to processing bottlenecks and overloaded equipment, the only messages to get through within the time limit established by DOD, were those of pinnacle destination (i.e., destined for the command seat of the government and indicating extreme emergency) and those arrived after the incident, which they might otherwise have prevented.

The elimination of these processing bottlenecks and duplication of effort, and their subsequent replacement with a centrally controlled facility, became the first of a process of change and modernization. The cost of complacency in any field is always high, whether measured in

Further reduction of handling time in the TCC has been brought about by new, computerized, automated systems.

dollars or lives, but the ability to correct and profit from our errors is priceless, and such is the theme of the Combat Developments Command.

Through the efforts of CDC, the continuing development of sophisticated automatic electronic communications equipment will enable the Department of Defense and the Army to provide the necessary and timely command and control of our internationally positioned forces. It will provide this nation with a more responsive fighting force, which will possess a faster, more controllable reaction to crisis situations. The newly devised and tested integrated and automated telecommunications center provides the Army with what could not have been dreamed of twenty years ago. From writer to reader there remain only two areas of well defined responsibility under the centralized control of the communications officer. Hopefully, the progress that has been made for future integration and continued automation will prevent crises of international proportions from affecting U.S. servicemen around the world. This goal can be achieved only by speeding the voice of command.

RESUPPLY REQUIREMENTS FOR THE ARMY IN THE FIELD

BY LT. DAVID V. KERNICH

REREQ is now operational on the Control Data 3300 at Ft. Leavenworth, and is presently being converted to the new Control Data large scale 6500 computer

CDC has a new data bank. REREQ, the acronym for Resupply Requirements for the Army in the Field, is a massive logistical data bank that was recently made available to interested parties throughout the Combat Developments Command. The need for centralization of logistical information to support studies relating to the resupply of the Army in the field was foreseen several years ago at CDC Supply Agency, Fort Lee, Virginia. The Supply Agency, with system analysis and programming assistance from the Research Analysis Corporation, sponsored the effort to develop a computerized data system to meet this need. The resulting software package was then installed on the Control Data 3300 at the CDC Automatic Data Processing Facility, Fort Leavenworth, Kansas.

Lt. Kernich is currently assigned to the CDC Supply Agency, Ft. Lee, Va.

The major thrust behind the initial development of REREQ did not involve the creation of new data sources but rather concentrated existing information at a single geographical location and provided computer programs capable of retrieving desired data in an efficient and timely manner.

REREQ draws on several sources to produce the eleven products presently available in the system. Among these are: the Army Materiel Command which provides extracts from their Army Master Data File (AMDF); the Continental Army Command which furnishes the CONARC Movement Planning and Status System (COMPASS); petroleum consumption data from the U.S. Army POL Center; and the CDC Directorate of Management Information Systems which prepares the TOE Master File. In addition, the Major Item Data Agency (MIDA) furnishes several inputs for REREQ: the Uni-

form Cost Accounting and Production Reporting System (UCAPRS); SB 700–20 and Product BO57 showing equipment LIN's accompanied by related data; also Products B524 and B525 showing ammunition/weapon information.

REREQ, as presently constituted, embodies eleven product outputs. With the exception of Product 9, all products are operational at this time. These are:

Product 1, Personnel Report: provides the number of one or more MOS's to be found in a specified force structure in a form similar to Section II of a TOE.

Product 2, Equipment Report: furnishes the quantity of line items of equipment by line item in a format similar to Section III of a TOE and aggregates same for a given Standard Requirements Code (SRC) as well as a defined force.

Product 3, Personnel Cost Report: displays personnel related cost information by MOS and by grade for given SRC's and summarized for an entire force. Cost factors are input by users.

Product 4, Equipment Price Report: shows the unit of issue price of LIN's (for selected FSN's) aggregated for an SRC and force structure.

Product 5, Class Resupply Report: provides resupply requirements in pounds, gallons, barrels, etc., for a specific SRC or for a force. Supply factors utilized are input by the user.

Product 6, LIN Resupply Report: shows resupply by LIN for an SRC or a force utilizing published resupply factors.

Product 7, Transportability Report: furnishes the weight, cube, length, height, and width and cube for quantities of the same LIN for a single SRC and for a complete force.

Product 8, LIN, FSN Classification Report: provides the Army type classification and the class/subclass of supply for each FSN under each LIN in the REREQ system.

Product 9, Power Information Reports: it furnishes—

a. Detailed information on characteristics of electric power producing and consuming items.

b. Capabilities of electric power producing items and power requirements for consuming items.

c. Asset information on electric power producing and consuming items; also asset information on any line items of equipment.

d. Depot overhaul cost information on any LIN's that are maintained on the overhaul cost file.

Product 10, Ammunition Report:

a. Resupply requirements in terms of rounds, costs, and packaged weight/cube for an SRC and a force.

b. Bulk ammunition resupply requirements in terms of pounds, cost and packaged weight/cube.

Product 11, Petroleum, Oil, and Lubricants Reports:

a. Resupply requirements in gallons or pounds, total costs, and packaged weight/cube for consuming LIN's in an SRC and a force.

b. POL consumption for ground equipment (computed on a per man per day basis for POL products lacking consumption rates on an LIN basis) in gallons or pounds, total costs, and packaged weight/cube for POL FSN's in an SRC and a force.

Personnel desiring to tap the REREQ data bank should be aware of two documents that are specifically designed to expedite this task. The first and most important is a User's Manual (CDC Pamphlet 18–3) that outlines the correct procedure for submission of product requests and contains detailed descriptions of REREQ products. The second document is a set of four input pads that assist the user in punching the computer cards that constitute a request to the REREQ system. Both of the above-mentioned documents have already been distributed to the Information System Officers at their respective CDC Agencies and Headquarters elements.

> Further inquires concerning REREQ may be addressed to either the CDC Supply Agency, Fort Lee, Virginia (LT David Kernich, AUTOVON 687–1800), or the Directorate of Management Information Systems, Fort Belvoir, Virginia (LT Jason Chamberlain, AUTOVON 354–6824).

Proponents of REREQ recognize that the present system does not provide all of the logistical information needed to support and analyze concepts, studies, and contingency plans developed by CDC. For this reason, work is already underway to expand the REREQ data bank to permit determination for the Army in the field of Classes I, II, and IV supply requirements. This effort is being undertaken by the Supply Agency with the assistance of the Computer Sciences Corporation. Ultimately, plans call for REREQ to contain data on construction materials, repair parts, port/airfield/highway/railway characteristics, and vehicular cargo-carrying capabilities. Development of more reliable supply rates for inclusion in REREQ is also seen as a problem to be addressed in the years ahead. All of this work will be undertaken for the sole purpose of providing elements of CDC and other authorized users with the logistical data they require to successfully accomplish their missions.

PROBABILITY VERSUS CAPABILITY

by Colonel George W. Peterson

There has long been disagreement in the US Army, even among intelligence personnel, concerning whether enemy capabilities or intentions should be determined in combat intelligence estimates. In some foreign armies, doctrine requires that intelligence officers deal in enemy intentions rather than capabilities.

US intelligence doctrine, on the other hand, clearly calls for the determination of enemy capabilities. FM 30–5, *Combat Intelligence*, states, "Commanders base plans and actions upon estimates of enemy capabilities and the probability of their adoption. Enemy capabilities can be estimated objectively because they are based upon knowledge of the area of operations, enemy situation, enemy doctrine, and time and space factors . . . ." Thus our current doctrine requires the G2 to analyze enemy capabilities and determine their probable order of adoption. Opponents of this doctrine, and there are many, believe that any G2 worth his salt should be able to define enemy intentions. In other words, the intelligence officer, they say, should be able to answer the question, "What is the enemy going to do?"

Let's examine the use of enemy intentions by commanders and intelligence officers for a moment. There have been many instances in history where commanders and G2's have based their decisions on enemy intentions with disastrous results. One of the most notable examples was the Pearl Harbor debacle. "The consideration overshadowing all others in the minds of the Hawaiian commanders was the belief and conviction that Pearl Harbor would not be attacked . . . It explains the reason for no effective steps being taken to meet the Japanese raiders on the morning of December 7th. '(From the Report of the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States.) With these words the congressional committee handed down its judgment. Their verdict is plain—an intelligence deficiency resulted in a command failure'." In this case, the Hawaiian commanders had hung their hats on enemy intentions—they obviously believed that the Japanese would not attack Pearl Harbor. They surely knew, however, that the Japanese military forces had the capability to mount such an attack. Another well-known example of the reliance on enemy intentions rather than capabilities occurred with calamitous results during the Korean War in late 1950. Although the Chinese Communists maintained the capability to conduct a large-scale ground invasion into North Korea, the United States top commanders refused to believe that such an invasion would take place, even in the face of irrefutable evidence and numerous indications pointing to the adoption of such a course of action. Thus, when the Chinese ground troops poured into North Korea in the late fall of 1950, in seemingly inexhaustible numbers, they found the United Nations forces strung out in a very vulnerable pursuit posture. Entire friendly units, such as the 8th Cavalry Regiment, 1st Cavalry Division, were overrun and decimated, and for all intents and purposes ceased to exist as effective fighting units. It is obvious that if the United States commanders has based their decisions on enemy capabilities, they would have had their troops in a much better posture to cope with the Chinese hordes. It is almost as though our high level commanders were relying heavily on wishful thinking. In this respect, there is sometimes a tendency for some commanders and staff officers, who deal in enemy intentions, to base their estimates on what they hope the enemy will do. They consciously or subconsciously believe that the enemy will attack our strongest defensive positioning, for example, when more often than not the enemy will avoid our strength and seek to penetrate weak spots.

Of course, when the G2 is able to predict accurately what the enemy is going to do, he is held in high esteem by the commander and his contemporaries. More often than not, however, the G2 who deals in enemy intentions will be wrong. It is true that he can base his estimates on enemy dispositions, indications, and enemy doctrine, but he will still be dependent on his

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crystal ball for intentions. There are too many variables which are subject to change at any time especially at the last minute. For example, the enemy commander may have decided on one course of action, only to change his mind and select another. Also, his orders are always subject to change by his higher commander. In addition, the enemy can implement cover and deception means to confuse the friendly G2 and the commander concerning the course of action he will actually employ. Moreover, it is not realistic for the G2 to deal in intentions concerning what the enemy will do, when in fact the enemy commander may not have made up his mind at the time on a course of action to pursue. As Colonel (now Major General, retired) T. F. Van Natta has put it, "A G–2 cannot tell his commander what the enemy is going to do. Probably no one can tell our commanders what the enemy is going to do, not even the enemy commander himself, as he may not have made up his own mind yet."

Turning to enemy capabilities, as mentioned earlier, current doctrine calls for a listing of capabilities in their probable order of adoption in the conclusions paragraph of the estimate. Thus, the probable order might be: (1) attack, (2) defend, (3) delay, or (4) reinforce. This system has proved to be effective, because it points up the most likely enemy capabilities to be employed in their relative order of adoption. Yet, the G2 does not say categorically that the enemy will attack, for example. A disadvantage of this system is the fact that the degree of likelihood of adoption of a capability is not identified. In the G2's view, the probability of an enemy attack may be very high, while the next listing, "defend," may be relatively low as far as probability is concerned. These variances are not shown in the conclusions, and are often not brought out in the analysis of enemy capabilities earlier in the estimate. It is therefore obvious in the current doctrine, that no method exists to weigh the probable courses of action in the final paragraph of the estimate. Thus, the users, i.e., commanders and staff officers, must determine the probability of occurrence of a certain enemy capability.

In order to overcome this shortcoming, the Combat Developments Command Intelligence Agency has devised a means to point up more effectively the relative likelihood of adoption of each of the enemy's various capabilities. The idea is to have the G2 assign a subjective probability, expressed as a percentage, to each of the capabilities in the estimate. For example, in a situation where our forces were going to attack, the G2 might assign a 60% probability to the enemy withdraw capability, a 30% probability to the enemy delay capability, and a 10% probability to the enemy defend capability. The G2 should be able to assign such percentages, based on a thorough analysis of enemy capabilities, his experience and knowledge of the enemy, indications, the enemy situation, and enemy doctrine. It is well known in Vietnam, for example, that in the face of a heavy attack by our forces, the enemy usually withdraws or evades. In such a situation, a high probability percentage could logically be assigned to the enemy's withdraw or evade capability. On the other hand, the numerical percentages assigned to his defend and reinforce capabilities would be much lower, even though these latter two capabilities may have been listed as the second and third capabilities available to the enemy. The adoption of such a sytem should satisfy the proponents of intentions as well as those of capabilities. It gives the commander what he needs and should expect: the enemy's possible courses of action and the relative chance, or probability, of adoption associated with each capability. The proposed system would also force the G2 to scrutinize more carefully his analysis of enemy capabilities in order to justify his probability percentages in the conclusions portion of the estimate.

There are admittedly some problems which can be anticipated in using this rating system. One is whether or not the enumerated capabilities are mutually exclusive. If the enemy can adopt only one of the listed capabilities; that is, they are mutually exclusive, then the sum of the percentages is 100. If the enemy can adopt more than one capability simultaneously however, the sum of the probabilities would be greater than 100. The solution to this problem lies in more precise definition of capabilities. Solving it and other problems does not appear too difficult and probably can be resolved through experimentation.

In summary, current US Army doctrine calls for determining enemy capabilities rather than enemy intentions in combat intelligence estimates. Although the present system leaves something to be desired, the G2 who deals in enemy intentions courts disaster. The system proposed by the Combat Developments Command Intelligence Agency should overcome most objections to basing combat estimates on enemy capabilities, since the relative degree of adoption of each capability would be included.

The Point of the Arrow

SEPTEMBER QUESTIONS

1. The use of professional historians to record the history of the United States Army began in what year?

2. What are the four "mission type" directorates at CDC headquarters?

3. What has replaced the Material Need document effective August 1972?

4. Who has the authorization to recommend changes to any Army field manual?

5. Radars can be divided into two general types: continuous wave and pulse. Which of the following is an advantage of the continuous wave radar?
   A. Can see moving targets in clutter.
   B. Permits easy determination of range data.
   C. Provides more accurate azimuth information.
   D. Is less susceptible to electronic countermeasure.

AUGUST ANSWERS

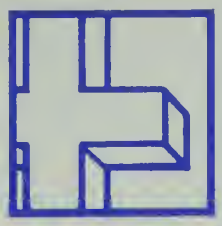
1. The maximum range of crew served image intensification night sights under moonlight conditions is generally limited to:
   A. 300 meters
   B. 800 meters
   (C.) 1200 meters
   D. 3000 meters

2. All but one of the following emplaced sensors (by air or ground) are under development:
   A. Electromagnetic intrusion detector
   (B.) Sector scanning radar with doppler beam sharpening.
   C. Electromagnetic detection of poorly shielded ignition systems.
   D. Foliage penetrating pulse doppler radar.

3. The newly invented silicon storage tube provides:
   A. Increased bit storage capability of core type memory devices.
   (B.) A means to store temporarily a visual image.
   C. A safer method of holding volatile chemicals.
   D. Increased bit storage capability of drum type memory devices.

4. The Dual Properties Steel Armor (DPSA) associated with the Armored Aerial Scout System (AARS) is intended to satisfy the following function?
   A. Provide fuselage and rotor protection against 7.62 and 12.7mm ball ammunition.
   B. Provide aircraft skin structure and protection against 12.7mm ball ammunition in the fuselage area only.
   (C.) Provide fuselage skin structure, load carrying structure and protection against 7.62mm ball ammunition.
   D. Provide for rigid, cashworthy fuselage and main rotor system.

5. "Fly-by-Wire" is?
   A. A helicopter control linkage which relies on moving control surfaces through wires attached to the pilot's controls.
   B. A hydro-mechanical system using wire linkage.
   (C.) A system through which the pilot's commands are, in essence, transmitted electrically to the control surfaces.
   D. Currently used as the primary flight control system in all cargo helicopters.



For God and Country

The following extract from the Congressional Record (House, June 30, 1971) was inserted by the Honorable Floyd Spence of South Carolina and is based on an article by the Rev. Norman C. Miller, pastor of the Morgan Park Methodist Church, Chicago. Reverend Miller is a member of the Army Reserve.

I have just returned from two weeks Army Reserve duty at Camp McCoy, Wis.

During my absence I missed a ministerial meeting. Last week when I attended the meeting, one of my ministerial friends smiled as I walked in, "Well, here comes the warmonger."

He aroused my anger and I said, "Why are you fellows in the ministry?" One replied, "We want to help where we can. We want to save souls and lives, not take them."

"I admire your zeal and your enthusiasm," I said, "but why are you so selective as to whom you will help and save?" I could see they were puzzled.

"You are saying a man drafted by his country to serve in the Army Forces is not worthy to receive the word of God. You told me you had no words of comfort, no compassion for the wounded and maimed, no benediction for the dying. You tell me, in your action, that you have no consolation for the heartbroken parents, for a shattered dream of a wife and children."

I feel sorry for those who have college degrees, yet are able only to see life in one aspect, and come to only one conclusion.

We had one of our young men who served in Viet Nam return to a base in California. His sergeant told him, "If you go into town don't wear your uniform, but if you must wear your uniform, for God's Sake don't wear your Viet Nam ribbons . . . you will be called a butcher and a murderer."

What is wrong with a nation which calls its young men and women to fight for freedom and the abolition of the oppressed and then rewards them by ridiculing and degrading them?"

War is horrible and tragic. It is a shame so many are called to die to protect freedom. Yet in the last year America has lost over 58,000 in automobile deaths. More than the total lost in the Vietnam war. However, you do not find young men burning their drivers license in protest, or dismantling their autos. Have you ever seen a well-meaning clergyman, solemnly intoning the names of 58,000 automobile deaths from the steps of the national or state capitol?

I admit I find it very difficult to understand those who plead for peace and are willing to use any violence to obtain it. Who preach love and peace while their faces mirror abject hatreds; who break the laws, rejoice in the spilled blood of authority, who greet those who disagree with them with shouts of "pigs."

These are those who claim "Establishment," without realizing that there is always the establishment." Russia, China, and Cuba, whom they admire so much also have an establishment, an establishment that does not allow criticism, no freedom to march, no freedom of speech.

I hate war and know what war can do to the human spirit, as well as the body. Yet I will not join the peace moratorium, I will not be a party to the vilifying of our President and our Nation. For my Bible tells me there is something worse than war, it is human slavery, human bondage, in which man is no longer man, either in spirit or body.

I shall work for peace, and pray for peace within the framework of my government and I shall hope in God.

Commanding General	**LTG John Norton**
Director, Command Presentations	**COL George H. Hallanan, Jr.**
Information Officer	**LTC Gerald D. Hill, Jr.**
Editor	**LT Robert H. Gregory**
Production Editor	**LT Gary R. Steimer**

The article in the August issue entitled "What Would Happen If . . ." was written by 2LT Gregory A. Goolkasian of the Systems Analysis Group at Ft. Belvoir, Va.